

CLAIMS

What is claimed is:

- 1 1. A method for estimating channel parameters from a communications signal  
2 containing interference, the method comprising the steps of:  
3 receiving a communications signal;  
4 generating a baseband signal from the communications signal;  
5 processing the baseband signal;  
6 selecting a maximum signal from the baseband signal;  
7 suppressing the interference when the maximum signal is not stronger the  
8 interference; and  
9 generating an estimate of the channel parameters from the maximum signal when the  
10 maximum signal is stronger than the interference.
- 1 2. The method as recited in claim 1 wherein the step of processing the baseband signal  
2 further comprises the steps of:  
3 descrambling the baseband signal;  
4 correlating the descrambled baseband signal with a set of spreading sequences; and  
5 performing maximum ratio combination correlations on the descrambled baseband  
6 signal and the set of spreading sequences.

1 3. The method as recited in claim 1 wherein the maximum signal comprises a common  
2 pilot channel.

1 4. The method as recited in claim 1 wherein the maximum signal comprises interfering  
2 signal components.

1 5. The method as recited in claim 1 wherein the step of suppressing the interference  
2 further comprises the steps of:

3 detecting one or more interference sequences;

4 generating a symbol estimate for each of the one or more interference sequences;

5 spreading the symbol estimate for each of the one or more interference sequences;

6 summing the spread symbol estimate for each of the one or more interference

7 sequences to generate a composite signal;

8 scrambling the composite signal;

9 applying a channel estimate to generate an estimate of an interfering signal

10 component of the composite signal; and

11 generating a new version of the baseband signal from a previous version of the

12 baseband signal and the estimate of an interfering signal component of the composite signal.

1 6. The method as recited in claim 1 further comprising the step of repeating the steps of  
2 processing the baseband signal, selecting the maximum signal from the baseband signal and  
3 suppressing the interference until the maximum signal is stronger than the interference.

1 7. A method for estimating channel parameters from a communications signal  
2 containing interference, the method comprising the steps of:  
3 receiving a communications signal;  
4 generating a baseband signal from the communications signal;  
5 processing the baseband signal to produce a first signal and a second signal;  
6 estimating a first channel parameter from the first signal and a second channel  
7 parameter from the second signal;  
8 suppressing the interference using a weighted average of the first channel parameter  
9 and the second channel parameter;  
10 repeating the steps of estimating the first and second channel parameters and  
11 suppressing the interference when the first signal is not stronger the interference; and  
12 generating an estimate of the channel parameters from the first signal when the first  
13 signal is stronger than the interference.

1 8. The method as recited in claim 7 wherein the step of processing the baseband signal  
2 further comprises the steps of:  
3 descrambling the baseband signal; and  
4 correlating the descrambled baseband signal with a set of spreading sequences.

1 9. The method as recited in claim 7 wherein the step of suppressing the interference  
2 further comprises the steps of:

3 generating an estimate of the channel parameters using a weighted average of the first  
4 channel parameter and the second channel parameter;

5 performing maximum ratio combination correlations on the processed baseband  
6 signal and the set of spreading sequences; and

7 selecting a new first signal using the maximum ratio combination correlations.

1 10. The method as recited in claim 7 wherein the first signal comprises a common pilot  
2 channel.

1 11. The method as recited in claim 7 wherein the second signal comprises interfering  
2 signal components.

1 12. The method as recited in claim 7 wherein the step of repeating the steps of estimating  
2 the first and second channel parameters and suppressing the interference when the first signal  
3 is not stronger the interference further comprises the step of selecting the second signal from  
4 a maximum signal of the processed baseband signal.

- 1    13.    An apparatus for estimating channel parameters from a communications signal  
2    comprising:  
3            an interference canceler coupled to a channel emulator;  
4            a descrambler coupled to the interference canceler;  
5            a correlator coupled to the descrambler  
6            a channel estimator coupled to the correlator;  
7            a maximal ratio combiner coupled to the correlator and the channel estimator;  
8            a symbol estimator and interferer sequence detector coupled to the maximal ratio  
9    combiner;  
10           a signal spreader coupled to the symbol estimator and interferer sequence detector;  
11           a scrambler coupled to the signal spreader; and  
12           the channel emulator coupled to the scrambler and the channel estimator.

1 14. A communications device comprising:  
2 an antenna;  
3 a receiver coupled to the antenna;  
4 a transmitter coupled to the antenna;  
5 a controller coupled to the receiver and the antenna;  
6 a display coupled to the controller;  
7 a speaker coupled to the controller;  
8 a memory coupled to the controller;  
9 a microphone coupled to the controller;  
10 a keypad coupled to the controller;  
11 the receiver comprising a radio frequency to baseband converter coupled to the  
12 antenna, a channel parameter estimator coupled to the baseband converter and the controller;  
13 and  
14 the channel parameter estimator comprising an interference canceler coupled to a  
15 channel emulator and the radio frequency to baseband converter, a descrambler coupled to  
16 the interference canceler, a correlator coupled to the descrambler, a channel estimator  
17 coupled to the correlator, a maximal ratio combiner coupled to the correlator, the channel  
18 estimator and the controller, a symbol estimator and interferer sequence detector coupled to  
19 the maximal ratio combiner, a signal spreader coupled to the symbol estimator and interferer  
20 sequence detector, a scrambler coupled to the signal spreader, and the channel emulator  
21 coupled to the scrambler and the channel estimator.

- 1 15. An apparatus for estimating channel parameters from a communications signal  
2 comprising:  
3 a descrambler;  
4 a correlator coupled to the descrambler  
5 a first channel estimator coupled to the correlator;  
6 a second channel estimator coupled to the correlator;  
7 a channel averaging device coupled to the first channel estimator and the second  
8 channel estimator;  
9 a maximal ratio combiner coupled to the correlator and the channel averaging device;  
10 and  
11 a symbol estimator and interferer sequence detector coupled to the maximal ratio  
12 combiner, the first channel estimator and the second channel estimator.

1 16. A communications device comprising:  
2 an antenna;  
3 a receiver coupled to the antenna;  
4 a transmitter coupled to the antenna;  
5 a controller coupled to the receiver and the antenna;  
6 a display coupled to the controller;  
7 a speaker coupled to the controller;  
8 a memory coupled to the controller;  
9 a microphone coupled to the controller;  
10 a keypad coupled to the controller;  
11 the receiver comprising a radio frequency to baseband converter coupled to the  
12 antenna, a channel parameter estimator coupled to the baseband converter and the controller;  
13 and  
14 the channel parameter estimator comprising a descrambler to the radio frequency to  
15 baseband converter, a correlator coupled to the descrambler, a first channel estimator coupled  
16 to the correlator, a second channel estimator coupled to the correlator, a channel averaging  
17 device coupled to the first channel estimator and the second channel estimator, a maximal  
18 ratio combiner coupled to the correlator and the channel averaging device, and a symbol  
19 estimator and interferer sequence detector coupled to the controller, the maximal ratio  
20 combiner, the first channel estimator and the second channel estimator.



1 17. A computer program embodied on a computer readable medium for estimating  
2 channel parameters from a communications signal containing interference, the computer  
3 program comprising:

- 4 a code segment for receiving a communications signal;
- 5 a code segment for generating a baseband signal from the communications signal;
- 6 a code segment for processing the baseband signal;
- 7 a code segment for selecting a maximum signal from the baseband signal;
- 8 a code segment for suppressing the interference when the maximum signal is not  
9 stronger the interference; and
- 10 a code segment for generating an estimate of the channel parameters from the  
11 maximum signal when the maximum signal is stronger than the interference.

1 18. The computer program as recited in claim 17 wherein the code segment for  
2 processing the baseband signal further comprises:

- 3 a code segment for descrambling the baseband signal;
- 4 a code segment for correlating the descrambled baseband signal with a set of  
5 spreading sequences; and
- 6 a code segment for performing maximum ratio combination correlations on the  
7 descrambled baseband signal and the set of spreading sequences.

1 19. The computer program as recited in claim 17 wherein the maximum signal comprises  
2 a common pilot channel.

1 20. The computer program as recited in claim 17 wherein the maximum signal comprises  
2 interfering signal components.

1 21. The computer program as recited in claim 17 wherein the code segment for  
2 suppressing the interference further comprises the steps of:

3 a code segment for detecting one or more interference sequences;

4 a code segment for generating a symbol estimate for each of the one or more  
5 interference sequences;

6 a code segment for spreading the symbol estimate for each of the one or more  
7 interference sequences;

8 a code segment for summing the spread symbol estimate for each of the one or more  
9 interference sequences to generate a composite signal;

10 a code segment for scrambling the composite signal;

11 a code segment for applying a channel estimate to generate an estimate of an  
12 interfering signal component of the composite signal; and

13 a code segment for generating a new version of the baseband signal from a previous  
14 version of the baseband signal and the estimate of an interfering signal component of the  
15 composite signal.

- 1    22.    The computer program as recited in claim 17 further comprising a code segment for  
2    repeatedly processing the baseband signal, selecting the maximum signal from the baseband  
3    signal and suppressing the interference until the maximum signal is stronger than the  
4    interference.

1 23. A computer program embodied on a computer readable medium for estimating  
2 channel parameters from a communications signal containing interference, the computer  
3 program comprising:  
4 a code segment for receiving a communications signal;  
5 a code segment for generating a baseband signal from the communications signal;  
6 a code segment for processing the baseband signal to produce a first signal and a  
7 second signal;  
8 a code segment for estimating a first channel parameter from the first signal and a  
9 second channel parameter from the second signal;  
10 a code segment for suppressing the interference using a weighted average of the first  
11 channel parameter and the second channel parameter;  
12 a code segment for repeating the steps of estimating the first and second channel  
13 parameters and suppressing the interference when the first signal is not stronger the  
14 interference; and  
15 a code segment for generating an estimate of the channel parameters from the first  
16 signal when the first signal is stronger than the interference.

1 24. The computer program as recited in claim 23 wherein the code segment for  
2 processing the baseband signal further comprises:

3 a code segment for descrambling the baseband signal; and

4 a code segment for correlating the descrambled baseband signal with a set of  
5 spreading sequences.

1 25. The computer program as recited in claim 23 wherein the code segment for  
2 suppressing the interference further comprises:

3 a code segment for generating an estimate of the channel parameters using a weighted  
4 average of the first channel parameter and the second channel parameter;

5 a code segment for performing maximum ratio combination correlations on the  
6 processed baseband signal and the set of spreading sequences; and

7 a code segment for selecting a new first signal using the maximum ratio combination  
8 correlations.

1 26. The computer program as recited in claim 23 wherein the first signal comprises a  
2 common pilot channel.

1 27. The computer program as recited in claim 23 wherein the second signal comprises  
2 interfering signal components.

1 28. The computer program as recited in claim 23 wherein the code segment for  
2 repeatedly estimating the first and second channel parameters and suppressing the  
3 interference when the first signal is not stronger the interference further comprises a code  
4 segment for selecting the second signal from a maximum signal of the processed baseband  
5 signal.

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